

1. (Currently amended) An apparatus for identifying characteristics of tissue, comprising:  
a radiation source configured to perform an axial scan of the tissue using radiation;  
and

an imaging system adapted to receive axial scan radiation based on the axial scan,  
and to process data relating to the axial scan radiation to identify characteristics of the  
tissue,

wherein the imaging system includes an interferometer adapted to direct a portion of  
the radiation emitted by the radiation source into a sample arm and detecting radiation  
reflected from the tissue back through the sample arm, and

wherein the imaging system identifies characteristics of the tissue by processing the  
axial scan radiation to provide the characteristics of the tissue, the axial scan radiation  
including radiation received from the a reference arm and radiation received from the  
sample arm, and comparing the characteristics of the tissue with a database of normalized  
characteristics of a plurality of tissue types, and

wherein at least one of (i) the radiation source is a swept wavelength optical source  
or (ii) the radiation source is a broad bandwidth light source and the imaging system  
includes a spectrometer.

2. (Original) The apparatus of claim 1, wherein the radiation source is a light source  
configured to emit light.

Claims 3 and 4 (Cancelled).

5. (Original) The apparatus of claim 2, wherein the light source delivers radiation to the  
tissue via an optical fiber disposed in an insertion device having a distal end at least

partially disposed within the insertion device and a proximal end.

6. (Original) The apparatus of claim 5, wherein the insertion device is configured to provide the distal end of the optical fiber adjacent to the tissue.

7. (Original) The apparatus of claim 5, wherein the insertion device is one of a barrel, a needle, and a stylet.

Claim 8 (Cancelled).

9. (Currently amended) The apparatus of claim 1, wherein the interferometer directs another portion of the radiation into the a reference arm.

Claim 10 (Cancelled)

11. (Currently amended) The apparatus of claim 1, wherein the sample changes the axial scan radiation includes at least one of the following properties of the axial scan radiation: backscattering, spectral properties, birefringence or and Doppler shift.

12. (Currently amended) The apparatus of claim 1, wherein the imaging system processes the axial scan radiation by performing at least one of standard deviation, average deviation, and or slope of the axial reflectivity profile relating to the axial scan radiation.

13. (Previously presented) The apparatus of claim 1, wherein the imaging system inputs data derived from the axial scan radiation into a statistical model to predict tissue type.

14. (Original) The apparatus of claim 13, wherein the statistical model extracts features from data derived from the axial scan radiation.

15. (Original) The apparatus of claim 13, wherein the statistical model is at least one of partial least squares or principle component analysis.

16. (Original) The apparatus of claim 1, wherein the imaging system identifies the characteristics of the tissue by determining reflectance characteristics of the axial scan radiation using interferometric ranging, and comparing the characteristics of the tissue with normalized reflectance characteristics of a plurality of types of tissue stored in a database.

17. (Original) The apparatus of claim 16, wherein the type of interferometric ranging is at least one of optical time domain reflectometry, spectral domain reflectometry and optical frequency domain reflectometry.

18. (Previously presented) A method for identifying characteristics of tissue, comprising the steps:

performing an axial scan of the tissue using radiation; and  
processing data relating to the axial scan radiation based on the axial scan to identify characteristics of the tissue using an imaging system, wherein a portion of the radiation emitted by the radiation source is directed into a sample arm and radiation reflected from the tissue back is obtained through the sample arm, wherein the processing step includes:

- a) identifying characteristics of the tissue by processing the axial scan radiation to provide the characteristics of the tissue, the axial scan radiation including radiation received from ~~the~~ a reference arm and radiation received from the sample arm, and
- b) comparing the characteristics of the tissue with a database of normalized

characteristics of a plurality of tissue types,

wherein at least one of (i) the radiation source is a swept wavelength optical source  
or (ii) the radiation source is a broad bandwidth light source and the imaging system  
includes a spectrometer.

19. (Currently amended) The method of claim 18, wherein the sample changes the axial  
scan radiation includes at least one of the following properties of the axial scan radiation:  
backscattering, spectral properties, birefringence or and Doppler shift.

20. (Currently amended) The method of claim 18, wherein the processing procedure step  
identifies the characteristics of the tissue by performing at least one of standard deviation of  
data associated with the axial scan radiation, average deviation of data associated with the  
axial scan radiation, and slope of the axial reflectivity profile of data associated with the  
axial scan radiation.

21. (Currently Amended) The method of claim 18, wherein the radiation source includes a  
light source delivers the radiation to perform the axial scan of the tissue via an optical fiber  
disposed in an insertion device having a distal end at least partially disposed within the  
insertion device and a proximal end.

22. (Currently Amended) The method of claim 18, wherein the processing step procedure  
identifies the characteristics of the tissue by inputting data derived from the axial scan  
radiation into a statistical model to predict a tissue type.

23. (Previously presented) The method of claim 18, wherein the processing step identifies  
the characteristics of the tissue by determining reflectance characteristics of the axial scan

radiation using interferometric ranging and comparing the characteristics of the tissue with a database of stored normalized reflectance characteristics of a plurality of types of tissue.

24. (Currently amended) A computer-accessible storage medium storing a software program for identifying characteristics of tissue, wherein the software program, when executed by a processing arrangement, is configured to cause the processing arrangement to execute the procedures steps comprising of:

causing a performance of performing an axial scan of the tissue using radiation using a radiation source; and

processing data relating to the axial scan radiation to identify characteristics of the tissue, wherein a portion of the radiation emitted by the radiation source is directed into a sample arm and radiation reflected from the tissue back is obtained through the sample arm, wherein the processing step includes:

- a) identifying characteristics of the tissue by processing the axial scan radiation to provide the characteristics of the tissue, the axial scan radiation including radiation received from the a reference arm and radiation received from the sample arm, and
- b) comparing the characteristics of the tissue with a database of normalized characteristics of a plurality of tissue types,

wherein at least one of (i) the radiation source is a swept wavelength optical source or (ii) the radiation source is a broad bandwidth light source and the processing arrangement is part of an imaging system which includes a spectrometer.

25. (Currently amended) The storage medium of claim 24, wherein the sample changes the

axial scan radiation includes at least one of the following properties of the axial scan radiation: backscattering, spectral properties, birefringence or and Doppler shift.

26. (Original) The storage medium of claim 24, wherein the processing step identifies the characteristics of the tissue by performing at least one of standard deviation of data associated with the axial scan radiation, average deviation of data associated with the axial scan radiation, and slope of the axial reflectivity profile of data associated with the axial scan radiation.

27. (Original) The storage medium of claim 24, wherein a light source delivers the radiation to perform the axial scan of the tissue via an optical fiber disposed in an insertion device having a distal end at least partially disposed within the insertion device and a proximal end.

28. (Original) The storage medium of claim 24, wherein the processing step identifies the characteristics of the tissue by inputting data derived from the axial scan radiation into a statistical model to predict tissue type.

29. (Previously presented) The storage medium of claim 24, wherein the processing step identifies the characteristics of the tissue by determining reflectance characteristics of the axial scan radiation using interferometric ranging and comparing the characteristics of the tissue with a database of stored normalized reflectance characteristics of a plurality of types of tissue.

30. (Currently amended) A software logic arrangement for identifying characteristics of tissue, which, when executed by a processing arrangement, is operable configures the

processing arrangement to perform procedures the steps comprising of:

causing a performance of performing an axial scan of the tissue using radiation  
using a radiation source; and

processing data relating to the axial scan radiation to identify characteristics of the tissue, wherein a portion of the radiation emitted by the radiation source is directed into a sample arm and radiation reflected from the tissue back is obtained through the sample arm, wherein the processing step includes:

- a) identifying characteristics of the tissue by processing the axial scan radiation to provide the characteristics of the tissue, the axial scan radiation including radiation received from ~~the a~~ reference arm and radiation received from the sample arm, and
- b) comparing the characteristics of the tissue with a database of normalized characteristics of a plurality of tissue types,

wherein at least one of (i) the radiation source is a swept wavelength optical source  
or (ii) the radiation source is a broad bandwidth light source and the processing  
arrangement is part of an imaging system which includes a spectrometer.

31. (Currently amended) The software logic arrangement of claim 30, wherein the sample  
changes the axial scan radiation includes at least one of the following properties of the axial  
scan radiation: backscattering, spectral properties, birefringence or and Doppler shift.

Claim 32 (Cancelled)

33. (Currently amended) The software logic arrangement of claim 30, wherein the radiation  
source includes a light source that delivers the radiation to perform the axial scan of the

tissue via an optical fiber disposed in an insertion device having a distal end at least partially disposed within the insertion device and a proximal end.

34. (Currently amended) The software logic arrangement of claim 30, wherein the processing procedure step identifies the characteristics of the tissue by inputting data derived from the axial scan radiation into a statistical model to predict tissue type.

35. (Currently amended) The software logic arrangement of claim 30, wherein the processing procedure step identifies the characteristics of the tissue by determining reflectance characteristics of the axial scan radiation using interferometric ranging and comparing the characteristics of the tissue with a database of stored normalized reflectance characteristics of a plurality of types of tissue.

36. (Original) An apparatus for identifying characteristics of tissue, comprising:  
a radiation source configured to deliver radiation to the tissue; and  
an imaging system adapted to receive the radiation and process unidimensional data relating to the radiation to identify characteristics of the tissue.

Claims 37-39 (Cancelled).

40. (Previously presented) The apparatus of claim 36, wherein the data is based on at least one of a spectral domain low-coherence interferometry and an optical frequency domain reflectrometry.

41. (Previously presented) An apparatus for identifying characteristics of tissue, comprising:  
a radiation source configured to perform an axial scan of the tissue using radiation;  
and

an imaging system adapted to receive axial scan radiation based on the axial scan, receive data relating to the axial scan radiation that is based on at least one of a spectral domain low-coherence interferometry or an optical frequency domain reflectrometry, and process the data to automatically identify characteristics of the tissue.

42. (Previously presented) An apparatus for identifying characteristics of tissue, comprising:

a radiation source configured to perform an axial scan of the tissue using radiation; and

an imaging system adapted to receive axial scan radiation based on the axial scan, and to process data relating to the axial scan radiation to identify characteristics of the tissue, wherein the imaging system processes the axial scan radiation by performing at least one of standard deviation, average deviation, and slope of the axial reflectivity profile relating to the axial scan radiation.

43. (Previously presented) An apparatus for identifying characteristics of tissue, comprising:

a radiation source configured to deliver radiation to the tissue; and

an imaging system adapted to receive the radiation and process unidimensional data relating to the radiation that is based on at least one of a spectral domain low-coherence interferometry or an optical frequency domain reflectrometry to identify characteristics of the tissue.

44. (New) An apparatus for identifying characteristics of tissue, comprising:

a radiation source configured to perform an axial scan of the tissue using radiation and deliver radiation to the tissue via an optical fiber disposed in an insertion device; and

an imaging system adapted to receive axial scan radiation based on the axial scan, and to process data relating to the axial scan radiation to identify characteristics of the tissue,

wherein the imaging system includes an interferometer adapted to direct a portion of the radiation emitted by the radiation source into a sample arm and detecting radiation reflected from the tissue back through the sample arm, and

wherein the imaging system identifies characteristics of the tissue by processing the axial scan radiation to provide the characteristics of the tissue, the axial scan radiation including radiation received from a reference arm and radiation received from the sample arm, and comparing the characteristics of the tissue with a database of normalized characteristics of a plurality of tissue types.